REMARKS

Claims 1-3, 5-9, 11-14, 16 and 17 are pending and rejected in this application. Claims 1, 2, 5, 7, 8, 9, 11, 13 and 17 are amended hereby.

Responsive to the Examiner's objection to the inventions title, Applicant has amended the title to recite, "POSITION SENSOR."

Responsive to the Examiner's objection to the drawings relative to the plural assemblies of claim 9, Applicant has amended claim 9 to not recite plural assemblies. For the forgoing reasons, Applicant submits that claim 9 is now in allowable form.

Responsive to the Examiner's objection to several informalities, Applicant, keeping the Examiner's comments in mind, has amended several paragraphs in the specification. For the foregoing reasons, Applicant submits that the amended specification is now in allowable form. Additionally, Applicant has amended Fig. 32, adding reference numbers and added a new paragraph to the specification to further explain Applicant's invention as depicted in Fig. 32.

Responsive to the Examiner's rejection of claims 1 and 3, under 35 U.S.C. § 102(b), as being anticipated by U.S. Patent No. 4,810,965 (Fujiwara et al.), Applicant has amended claim 1 and amended claim 3 into independent form to further protect Applicant's invention and submits that claims 1 and 3 are now in condition for allowance.

Fujiwara et al. disclose a position detecting apparatus using a magnetic sensor and a closed magnetic circuit with non-uniform magnetic flux distribution (Figs. 7) including closed magnetic circuit 36 having two yoke plates 33 and 34, two permanent magnets 31 and 32, a magnetic sensor 15, a supporting member 37 and a transferring base 38. Yokes 33 and 34 are made of magnetic material, such as iron plate. Magnets 31 and 32 are arranged between yoke plates 33 and 34 with the direction of the pole axes opposite to each other (column 8, lines 37-51).

Magnetic sensor 15 traverses the inside surface of yoke 33 or 34, sensing the magnetic field intensity of the leakage flux therebetween. The coercive force of magnets 31 and 32 is selected to be between 1,000 Oe and 1,600 Oe with a distance of 260 mm between magnet 31 and magnet 32 (column 8, line 62 – column 9, line 2). The measuring range is 200 mm total (column 9, lines 11-13).

In contrast, claim 1, as amended recites in part:

> at least two magnets; [and]
>
> a singular ferrous plate...

(Emphasis added). Applicant submits that such an invention is neither taught, disclosed nor suggested by Fujiwara, et al. or any of the other cited references, alone or in combination, and includes distinct advantages thereover.

Fujiwara et al. disclose a position detecting apparatus using a magnetic sensor in a closed magnetic circuit with non-uniform magnetic flux distribution including two yoke plates and two permanent magnets. Fujiwara et al. also disclose a single yoke plate with a single magnet. However, Fujiwara et al. and any of the other cited references, alone or in combination, fail to disclose, teach or suggest at least two magnets and a singular ferrous plate, as recited in claim 1.

An advantage of Applicant's invention is that movement of the magnetic flux responsive device is not constrained by being within a yoke or within two ferrous plates bounded by two magnets. Additionally, Applicant's invention advantageously can be made in a smaller amount of space since only a singular ferrous plate is utilized. For the foregoing reasons, Applicant submits that claim 1 is now in condition for allowance, which is hereby respectfully requested.

In further contrast, claim 3, as amended recites in part:

> at least two magnets;

> a least one ferrous plate ...; and
>
> a first magnetic flux responsive device and a second magnetic flux responsive device, said first magnetic flux responsive device a fixed distance from said second magnetic flux responsive device

(Emphasis added). Applicant submits that such an invention is neither taught, disclosed nor suggested by Fujiwara, et al. or any of the other cited references, alone or in combination, and includes distinct advantages thereover.

Fujiwara et al. disclose a position detecting apparatus using a magnetic sensor in a closed magnetic circuit with non-uniform magnetic flux distribution including two yoke plates and two permanent magnets. Fujiwara et al. also disclose a single yoke plate with a single magnet. However, Fujiwara et al. and any of the other cited references, alone or in combination, fail to disclose, teach or suggest at least two magnets, a least one ferrous plate, a first magnetic flux responsive device and a second magnetic flux responsive device, the first magnetic flux responsive device a fixed distance from the second magnetic flux responsive device, as recited in claim 3.

An advantage of Applicant's invention is that multiple magnetic flux responsive devices, a fixed distance apart, compensates for the magnetic field reversal that will occur to each device once each revolution in a rotary application. Additionally, Applicant's use of at least two magnetic flux responsive devices increases the positional accuracy in that the outputs can be averaged together to reduce variations in an assembly. Still further, outputs from multiple magnetic flux responsive devices provide system redundancy. For the foregoing reasons, Applicant submits that claim 3 is now in condition for allowance, which is hereby respectfully requested.

Claim 2 has been rejected under 35 U.S.C. § 103(a) as being unpatentable over Fujiwara et al. However, claim 2 depends from claim 1, and claim 1 has been placed in condition for allowance for the reasons given above. Accordingly, Applicant submits that claim 2 is in condition for allowance, which is hereby respectfully requested.

Responsive to the Examiner's rejection of claims 1-3, 5, 6 and 17 under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,211,668 (Duesler et al.), Applicant has amended claims 1, 3, 5 and 17, and submits that claims 1-3, 5, 6 and 17 are now in condition for allowance.

Duesler, et al. disclose a magnetic position sensor having opposed taper magnets including a first plate 301 and a second plate 302 which are pole pieces. Maintanent assembly 300 includes four tapered magnetic regions or portions 321, 322, 323 and 324, and a magnetic spacer 320. If magnetic spacer 320 is used first plate 301 and second plate 302 are not needed for structural reasons and may be omitted. Pole pieces 301 and 302 serve the purpose of intensifying the magnetic flux produced for the four tapered magnetic regions 321, 322, 323 and 324 (column 4, lines 16-41). Inner gap 516 is formed between magnetic regions 321, 322, 323 and 324. As can be seen in fig. 5, air gap 516 is essentially diamond shaped, with the central portion of air gap 517 being larger than both ends 518 of air gap 516. A magnetic flux sensor device 575 is positioned within air gap 516. As Hall effect device 575 moves along line 540 magnetic field is larger and positive at first end 541 of the air gap and decreases substantially linearly as it approaches the middle 543 of the air gap at which point the magnetic field will be substantially zero. As Hall effect device 575 travels along line 540 from middle 543 to second end 542 of air gap 516 the polarity of the magnetic field detected will be negative but other substantially linearly increasing magnitude (column 5, line 40-67).

In contrast, claim 1, as amended, recites in part:

> a magnetic flux responsive device ... closer to said ferrous plate than to any of said at least two magnets.

(Emphasis added). Applicant submits that such an invention is neither taught, disclosed nor suggested by Duesler et al. or any other cited references, alone or in combination include distinct advantages thereover.

Duesler et al. disclose a magnetic position sensor having opposed tapering magnets with a pole piece on the side of the magnet opposite the magnetic flux sensor device. However, Duesler et al. and any of the other cited references, alone or in combination fail to disclose, teach or suggest a magnetic flux responsive device closer to the ferrous plate than to any of the at least two magnets, as recited in claim 1.

An advantage of Applicant's invention is that the magnetic field sensed by the magnetic flux responsive device is associated with the magnetic field carried in the ferrous plate. Another advantage of Applicant's invention is the simplicity of construction precludes the need for having shaped magnets that correspond to a specific profile. Still another advantage of Applicant's invention is that it is not dependent upon varying air gap between the flux responsive device and a magnet to determine position. For the foregoing reasons, Applicant submits that claim 1 and claim 2 depending therefrom, are now in condition for allowance, which is hereby respectfully requested.

In further contrast, claim 3, as amended recites in part:

> at least two magnets;
>
> a least one ferrous plate ...; and
>
> a first magnetic flux responsive device and a second magnetic flux responsive device, said first magnetic flux responsive device a fixed distance from said second magnetic flux responsive device

(Emphasis added). Applicant submits that such an invention is neither taught, disclosed nor suggested by Duesler et al. or any of the other cited references, alone or in combination, and includes distinct advantages thereover.

Duesler et al. disclose a magnetic position sensor having opposed tapering magnets with a pole piece on the side of the magnet opposite the magnetic flux sensor device. However, Duesler et al. and any of the other cited references, alone or in combination, fail to disclose, teach or suggest at least two magnets, a least one ferrous plate, a first magnetic flux responsive device and a second magnetic flux responsive device, the first magnetic flux responsive device a fixed distance from the second magnetic flux responsive device, as recited in claim 3.

An advantage of Applicant's invention is that multiple magnetic flux responsive devices, a fixed distance apart, compensates for the magnetic field reversal that will occur to each device once each revolution in a rotary application. Additionally, Applicant's use of at least two magnetic flux responsive devices increases the positional accuracy in that the outputs can be averaged together to reduce variations in an assembly. Still further, outputs from multiple magnetic flux responsive devices provide system redundancy. For the foregoing reasons, Applicant submits that claim 3 is now in condition for allowance, which is hereby respectfully requested.

In further contrast, claim 5, as amended, recites in part:

> a first ferrous plate including a first side and a second side, said first ferrous plate having <u>two of said at least four magnets located along said first side ...;</u>
>
> a second ferrous plate including a first side and a second side, said second ferrous plate having an <u>other two of said at least four magnets located along said first side</u> ...; and
>
> at least one magnetic flux responsive device disposed <u>between said second side of said first ferrous plate and said second side of said second ferrous plate...</u>

(Emphasis added). Applicant submits that such an invention is neither taught, disclosed nor suggested by Duesler et al. or any other cited references, alone or in combination include distinct advantages thereover.

Duesler et al. disclose a magnetic position sensor having opposed tapering magnets with a pole piece on the side of the magnet opposite the magnetic flux sensor device. However, Duesler et al. and any of the other cited references, alone or in combination fail to disclose, teach or suggest a first ferrous plate including a first side and a second side, the first ferrous plate having two of the at least four magnets located along the first side, a second ferrous plate including a first side and a second side, the second ferrous plate having an other two of the at least four magnets located along the first side and at least one magnetic flux responsive device disposed between the second side of the first ferrous plate and the second side of the second ferrous plate, as recited in claim 5.

An advantage of Applicant's invention is that the magnetic field sensed by the magnetic flux responsive device is associated with the magnetic field carried in the ferrous plate. Another advantage of Applicant's invention is the simplicity of construction precludes the need for having shaped magnets that correspond to a specific profile. Still another advantage of Applicant's invention is that it is not dependent upon varying air gap between the flux responsive device and a magnet to determine position. For the foregoing reasons, Applicant submits that claim 5 and claim 6 depending therefrom, are now in condition for allowance, which is hereby respectfully requested.

In still further contrast, claim 17, as amended, recites in part:

> said magnetic flux responsive device being <u>closer to said first ferrous plate and said second ferrous plate than to said two magnets</u>;

(Emphasis added). Applicant submits that such an invention is neither taught, disclosed nor suggested by Duesler et al. or any other cited references, alone or in combination include distinct advantages thereover.

Duesler et al. disclose a magnetic position sensor having opposed tapering magnets with a pole piece on the side of the magnet opposite the magnetic flux sensor device. However, Duesler et al. and any of the other cited references, alone or in combination fail to disclose, teach or suggest a magnetic flux responsive device being closer to a first ferrous plate and a second ferrous plate than to the two magnets, as recited in claim 17.

An advantage of Applicant's invention is that the magnetic field sensed by the magnetic flux responsive device is associated with the magnetic field carried in the ferrous plate. Another advantage of Applicant's invention is the simplicity of construction precludes the need for having shaped magnets that correspond to a specific profile. Still another advantage of Applicant's invention is that it is not dependent upon varying air gap between the flux responsive device and a magnet to determine position. For the foregoing reasons, Applicant submits that claim 17 is now in condition for allowance, which is hereby respectfully requested.

Responsive to the Examiner's rejection of claim 9 under 35 U.S.C. § 103(a) as being unpatentable over Duesler et al., Applicant has amended claim 9 removing the plurality of arrangements and indicating that magnetic flux responsive device may traverse completely through the ferrous plate assembly as is illustrated in Figs 32 and 37. For the foregoing reasons, Applicant submits that claim 9 is now in condition for allowance, which is hereby respectfully requested.

Responsive to the Examiner's rejection of claims 5-9, 11-14 and 16 under 35 U.S.C. § 112, second paragraph as being indefinite, Applicant has amended claims 5, 7, 8, 9, 11 and 13 and submits that claims 5-9, 11-14 and 16 are now in condition for allowance, which is hereby respectfully requested.

The Examiner indicated that in claim 5 it is not clear what magnetic flux the magnetic flux is responsive to. Applicant has specifically amended claim 5 to indicate that the magnetic flux responsive device is at least partially responsive to the magnetic flux from the at least four magnets. The Examiner has commented regarding claim 7 that it is not clear in what way the magnetic shunt is proximate at least two of the magnets and what is being shunted. Applicant has amended claim 7 to indicate that the magnetic shunt is shunting magnetic flux and since the claim indicates that magnetic shunt is disposed proximate to at least two of the four magnets and this is taught in the specification and shown in the drawings Applicant submits that the claim does clearly claim what is disclosed and is the Applicant's invention. Relative to claim 8, the Examiner indicates it is not clear where the air gaps are located with respect to the magnets and what function the air gaps perform. Applicant has amended claim 8 to further clarify and indicate that the air gap is associated with a discontinuity of the ferrous plates. While the air gaps allow the magnetic circuit to be open, Applicant contends that it is not necessary to state the function in the claim. Relative to the Examiner's comments regarding claim 9, the Applicant has amended claim 9 to no longer recite the plurality of assemblies. Relative to the Examiner's comments on claim 11, Applicant has amended claim 11 to indicate that the magnets are coupled to the ferrous plates and that the magnetic flux responsive device is at least partially responsive to the magnetic flux from the magnets. The Examiner's comment, regarding claim 13, that it is not clear in what way the magnetic shunt is proximate to one of the two magnets and what is being shunted.

Applicant has amended claim 13 to indicate that the magnetic shunt shunts the magnetic flux of the magnets. Since the magnetic shunt is shunting magnetic flux it only needs to be proximate to the magnets and not necessarily in physical contact with the magnets.

For the foregoing reasons, Applicant submits that the pending claims are definite and do particularly point out and distinctly claim the subject matter which Applicant's regard as the invention. Moreover, Applicant submits that no combination of the cited references teaches, discloses or suggests the subject matter of the amended claims. The pending claims are therefore in condition for allowance, and Applicant respectfully requests withdrawal of all rejections and allowance of the claims.

In the event Applicant has overlooked the need for an extension of time, an additional extension of time, payment of fee, or additional payment of fee, Applicant hereby conditionally petitions therefor and authorizes that any charges be made to Deposit Account No. 20-0095, TAYLOR & AUST, P.C.

Should any question concerning any of the foregoing arise, the Examiner is invited to telephone the undersigned at (260) 897-3400.

Respectfully submitted,

Todd T. Taylor
Registration No. 36,945

Attorney for Applicant

TTT6/dc

TAYLOR & AUST, P.C.
142 S. Main Street
P.O. Box 560
Avilla, IN 46710
Telephone: 260-897-3400
Facsimile: 260-897-9300

Enc.: Return postcard

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Todd T. Taylor, Reg. No. 36,945
Name of Registered Representative

Signature

August 1, 2003
Date